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## Chemical composition of the essential oil from the bark *Bursera tomentosa* (Jacq) Tr & Planch

[Composición química del aceite esencial de la corteza de *Bursera tomentosa* (Burseraceae) (Jacq) Tr & Planch]

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### Abstract

The bark of *Bursera tomentosa* was collected at full flowering stage in September 2002 at Cabudare, Lara State. The essential oil was isolated by hydrodistillation and it was analyzed by GC and GC/MS. Twenty eight components were identified which made up 90.1 % of the oil. The main constituents of the essential oil were: spatulenol (11.4 %), globulol (8.9 %), epi- $\alpha$ -Cadinol (8.8 %) and *cis*-ocimene (7.3 %).

**Keywords:** *Bursera tomentosa*, Burseraceae, spatulenol, globulol.

### Resumen

La corteza de *Bursera tomentosa*, fue recolectada en estado de floración en el mes de septiembre 2002 en Cabudare, Estado Lara. El aceite esencial fue obtenido por hidrodestilación y analizado por CG y CG/EM. Se identificó veinte y ocho compuestos que constituyen el 90.1% del aceite. Los constituyentes mayoritarios del aceite esencial fueron spatulenol (11.4%), globulol (8.9%), epi- $\alpha$ -cadinol (8.8 %) y *cis*-ocimeno (7.3%).

Palabras Clave: *Bursera tomentosa*, Burseraceae, spatulenol, globulol

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## INTRODUCTION

The *Burseraceae* family is distributed in tropical and subtropical areas of the World. It is divided into three tribes: *Protieae*, *Boswelieae* (*Bursereae*) y *Canarieae* (Perne, 1972). The genus *Bursera* comprises about 40 species (Ricardi, 1992; Young *et al.*, 2007; Robles *et al.* 2005). It has been reported that plants of this genus produce balm type terpenoidal resins which contain monoterpenes, sesquiterpenes, and triterpenes, but rarely diterpenoids (Berry *et al.*, 1997). *Bursera tomentosa* is a tree 5 to 8 meters high with oblong, deciduous leaves, small white flowers, clustered in panicles (Sugden, 1984). It is found in Central America, Colombia, and Venezuela (Langenheim, 2003; Schnee, 1994) where it is known as "Bálsamo de incienso" and it is regarded a medicinal plant with antiinflammatory activity (Castillo *et al.*, 2005; Gonzales, 1999). The essential oil composition of some species of this family have been reported to contain terpene type compounds. Spatulanol, cadinene, elemene, germacrene B,  $\alpha$ -pineno,  $\alpha$ -thujene, *cis*-ocimene, *n*-nonene and germacrene-D have been found in the wood of the *Bursera graveolens*, the leaves of *Protium spruceanum*, as well as in fruits of *Bursera tomentosa* (Yukawa *et al.*, 2006; Machado, 2003; Moreno *et al.*, 2010). The present study deals with the chemical composition of the essential oil obtained from the bark of *Bursera tomentosa*.

## MATERIALS AND METHODS

### Plant material

The bark of *Bursera tomentosa* was collected at the Experimental Station, University Lisandro Alvarado, at Cabudare, Lara State, during september 2002, at 570 m.a.s.l. A Voucher Specimen (Code N° 7115) has been deposited at the UCOB "José A. Casa Diego" Herbarium. The plant was identified by Eng. Florangel Diaz, member of the staff of Decanato de Agronomía. It was compared with an already existing voucher (Code N° 3503).

### Isolation of essential oil

The bark of *Bursera tomentosa* (1Kg) was cut into small pieces and subjected to hydrodistillation for 3 h, using a Clevenger-type apparatus to yield 2.0 mL of oil. It was dried with anhydrous Na<sub>2</sub>SO<sub>4</sub>, and stored at 4 °C under N<sub>2</sub>.

### Gas chromatography

The oil was analyzed on a Perkin Elmer Autosystem gas chromatograph equipped with split injector (50:1) using a 60 m x 0.25 mm fused-silica AT-5 Altech capillary column. Injector and detector temperature was 250 °C and a flow rate of 0.8 ml/min of Helium was used. After an initial temperature of 60 °C (1 min.) the temperature of the columns was raised at 4 °C/min up to 260 °C. The Kováts retention indices (RI) were determined relative to the retention times of a series of *n*-paraffin hydrocarbons

(C<sub>7</sub>-C<sub>22</sub>) (Davies, 1990; Adams, 2007; Swigar *et al.*, 1981).

### Gas Chromatography-Mass Spectrometry

Samples were analyzed by GC/MS on an HP 5973 mass spectrometer system fitted with a 30 m long cross-linked 5 % phenylmethyl siloxane (HP-5MS, Hewlett Packard, USA) fused-silica column (0.25 mm diam., film thickness 0.25  $\mu$ m). The initial oven temperature was 60 °C (1.0 min), the oven was subsequently heated at 3 °C/min to 200 °C and then to a final temperature of 280 °C at 10 °C/min; the transfer line temperature was held at 280 °C; source temperature 230 °C; quadrupole temperature, 150 °C; carrier gas, helium, adjusted to a linear velocity of 34 M/s; ionization energy, 70 eV; scan range, 40-500 amu; 3.9 scans/s. Samples (1.0  $\mu$ l) were injected as 2 % solutions of the oils in *n*-heptane. A Hewlett-Packard ALS injector was used with split ratio 50:1. Identification of the oil components was established using a Wiley MS Data Library (6<sup>th</sup> edn), reference mass spectra from published sources, comparison with reference compounds, and retention indices (Adams, 2007; Sandra and Bichi, 1987).

## RESULTS AND DISCUSSION

The bark of *Bursera tomentosa* yielded (2 ml, 0.2 %) of essential oil. GC/MS analyses performed on the oil showed permitted to identify twenty eight components, representing 90.1 % of the oil. A list of identified compounds, along with their percentage composition, is given on Table 1. The most abundant constituents were spatulanol (11.4 %), globulol (8.9 %), epi- $\beta$ -Cadinol (8.8 %) and *cis*-ocimene (7.3 %). Other compounds identified were bicyclogermacrene (6.6 %), 1-nonane (6.4 %) and  $\beta$ -selinene (3.9%). According to Moreno *et al* (2010) the essential oil of the fruits of *Bursera tomentosa* has a different composition from that of the bark since it contains 98.2% hydrocarbons while the oil from the bark contains 46.6% hydrocarbons and 43.5% oxygenated compounds. According to the references consulted, there have been no studies on the chemical composition of the essential oil of the bark of *Bursera tomentosa*.

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**Table 1:** Percentage composition of the oil from the bark of *Bursera tomentosa*.

Components	leaves (%)	RI
1-Nonane	6.4	902
<b>cis-Ocimene</b>	<b>7.3</b>	<b>1038</b>
1-Undecene	0.9	1099
trans-carveol	0.4	1220
$\delta$ -Elemene	0.5	1353
$\beta$ -Elemene	2.7	1404
$\alpha$ -Gurjunene	0.5	1423
Aromadendrene	1.3	1454
Neo- $\alpha$ -clovene	0.7	1468
seychellene	0.7	1483
Alloaromadendeno	1.2	1477
$\gamma$ -Himachalene	3.4	1495
Germacrene D	0.6	1498
$\beta$ -Selinene	3.9	1503
Viridiflorene	1.2	1503
Bicyclogermacrene	6.6	1513
$\beta$ -himachalene	1.2	1515
7-epi- $\alpha$ -selinene	1.6	1517
$\delta$ -Cadinene	1.3	1540
Ledol	1.2	1580
<b>Spathulenol</b>	<b>11.4</b>	<b>1595</b>
<b>Globulol</b>	<b>8.9</b>	<b>1599</b>
Viridiflorol	4.4	1610
$\beta$ -biotol	2.9	1619
1,10-di-epi-cubenol	1.7	1624
<b>epi-<math>\alpha</math>-Cadinol</b>	<b>8.8</b>	<b>1630</b>
Himachalol	3.8	1634
$\alpha$ -Cadinol	4.6	1637

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